FIG. 1

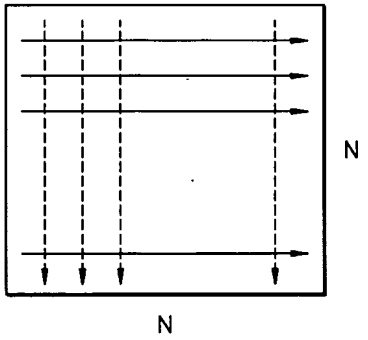


FIG. 2

	NUMBER OF MULTIPLICATIONS	NUMBER OF ADDITIONS
Chen	256	416
Wang	256	416
Lee	208	464
AAN	208	464

FIG. 3

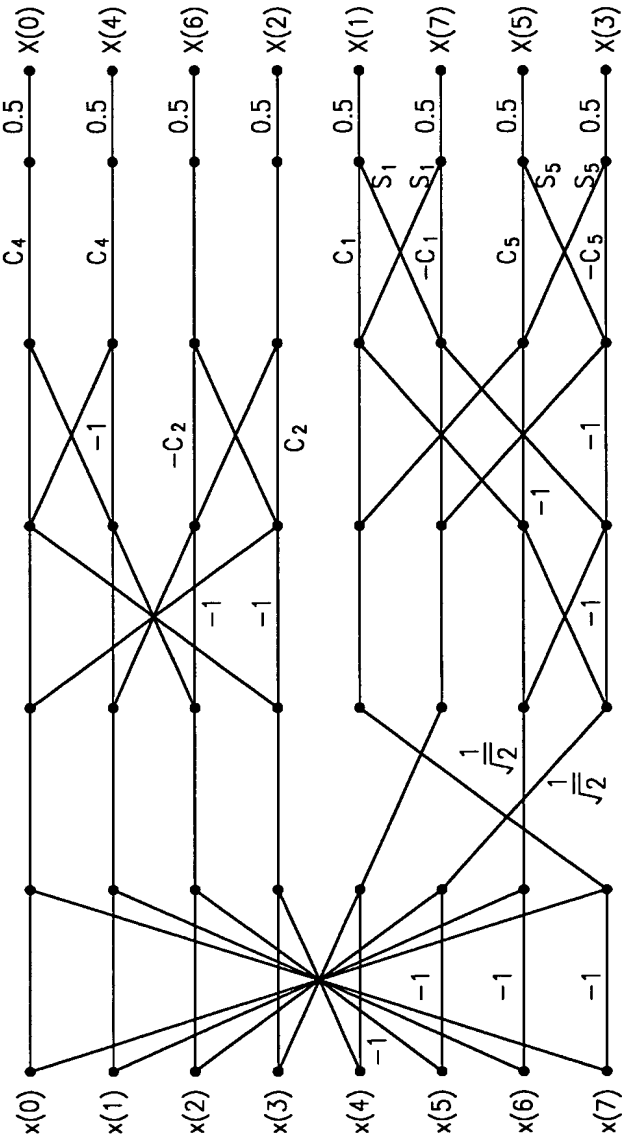

X(0)
X(4)
X(6)
X(2)
X(1)
X(7)
X(5)
X(3)
0.5
C4
-1
-C2
C2
S1
-C1
C1
C5
-C5
S5
1/√2
x(0)
x(1)
x(2)
x(3)
x(4)
x(5)
x(6)
x(7)

FIG. 4

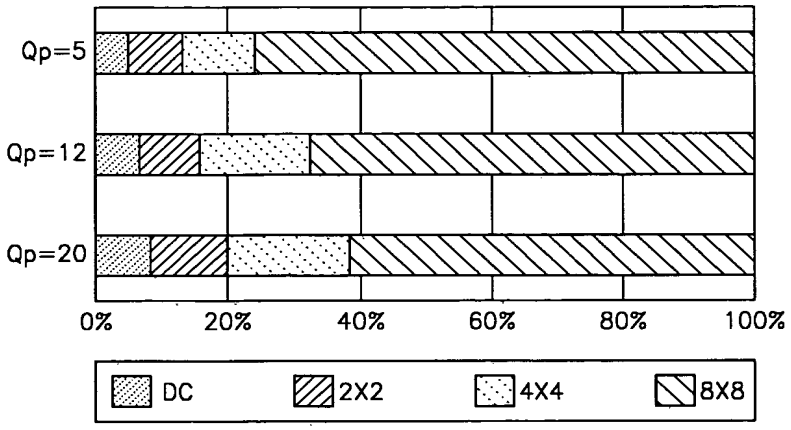

Qp=5
Qp=12
Qp=20
0%
20%
40%
60%
80%
100%
DC
2X2
4X4
8X8

FIG. 5

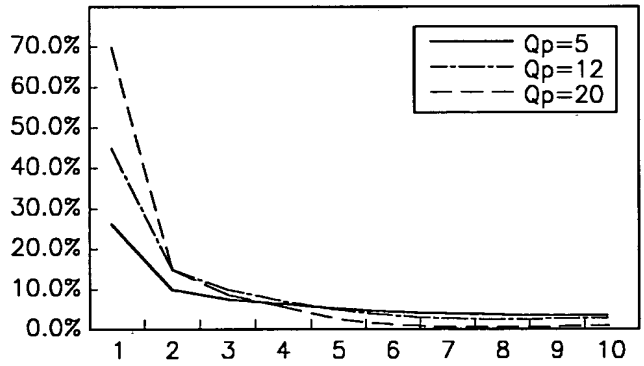

70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
1
2
3
4
5
6
7
8
9
10
Qp=5
Qp=12
Qp=20

FIG. 6

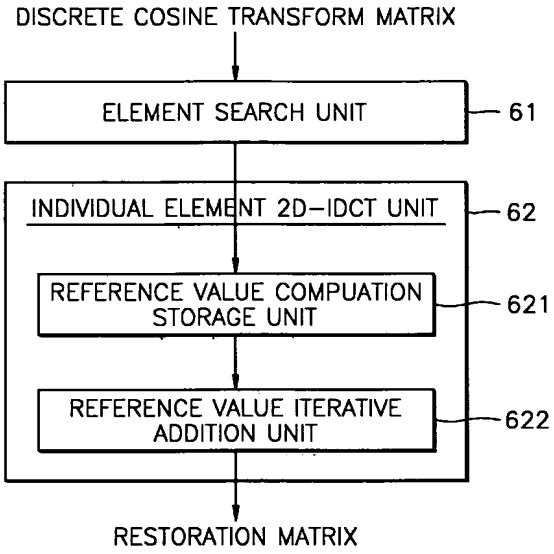

DISCRETE COSINE TRANSFORM MATRIX
ELEMENT SEARCH UNIT
61
INDIVIDUAL ELEMENT 2D-IDCT UNIT
62
REFERENCE VALUE COMPUATION STORAGE UNIT
621
REFERENCE VALUE ITERATIVE ADDITION UNIT
622
RESTORATION MATRIX

FIG. 7

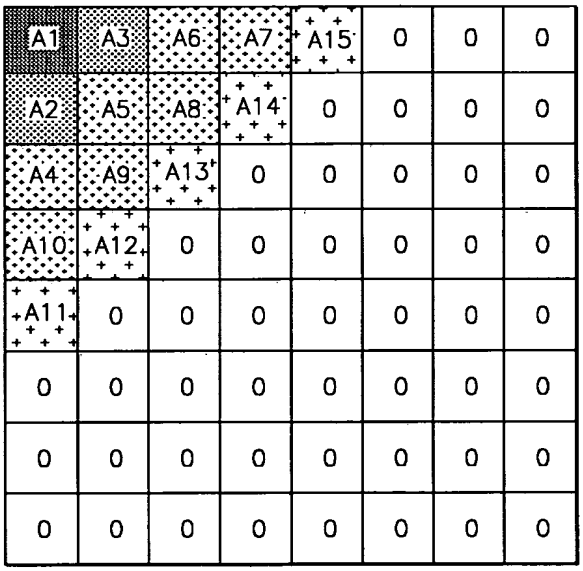


FIG. 8

m, n	1	2				3		4				5	6				7		8			
sign	+	+	+	+	+	+	+	+	−	−	−	+	+	−	+	+	+	−	+	−	+	−
k, p	4	1	3	5	7	2	6	3	7	1	5	4	5	1	7	3	6	2	7	5	3	1

FIG. 9

1	4	2	4	1	4	2	4
4	10	8	10	4	10	8	10
2	8	3	8	2	8	3	8
4	10	8	10	4	10	8	10
1	4	2	4	1	4	2	4
4	10	8	10	4	10	8	10
2	8	3	8	2	8	3	8
4	10	8	10	4	10	8	10

FIG. 10

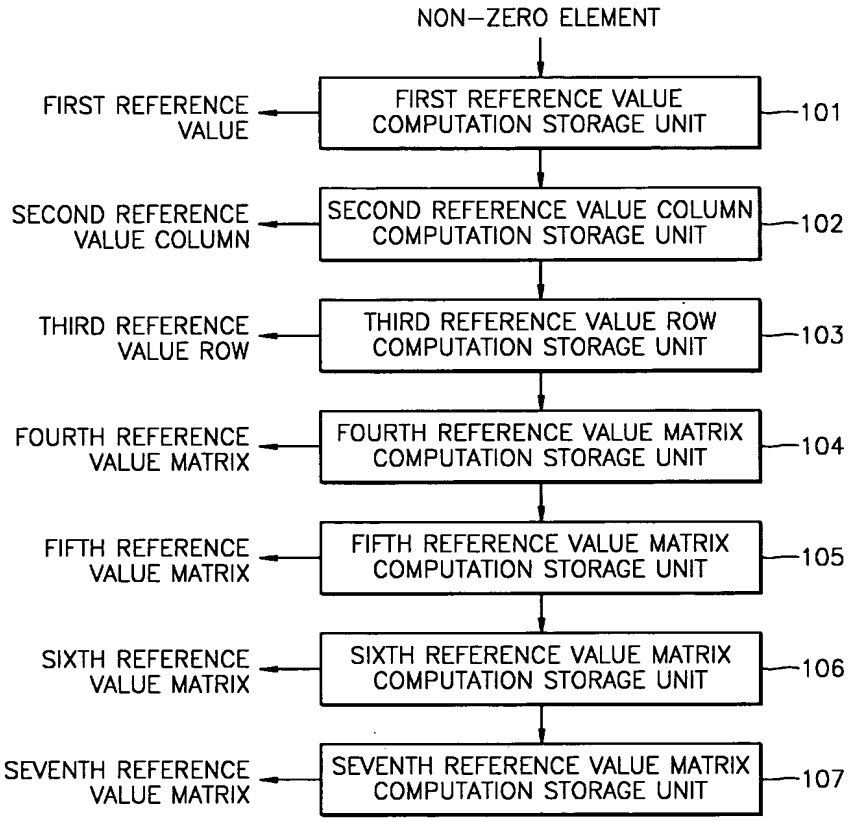

NON-ZERO ELEMENT
FIRST REFERENCE VALUE
FIRST REFERENCE VALUE COMPUTATION STORAGE UNIT
101
SECOND REFERENCE VALUE COLUMN
SECOND REFERENCE VALUE COLUMN COMPUTATION STORAGE UNIT
102
THIRD REFERENCE VALUE ROW
THIRD REFERENCE VALUE ROW COMPUTATION STORAGE UNIT
103
FOURTH REFERENCE VALUE MATRIX
FOURTH REFERENCE VALUE MATRIX COMPUTATION STORAGE UNIT
104
FIFTH REFERENCE VALUE MATRIX
FIFTH REFERENCE VALUE MATRIX COMPUTATION STORAGE UNIT
105
SIXTH REFERENCE VALUE MATRIX
SIXTH REFERENCE VALUE MATRIX COMPUTATION STORAGE UNIT
106
SEVENTH REFERENCE VALUE MATRIX
SEVENTH REFERENCE VALUE MATRIX COMPUTATION STORAGE UNIT
107

FIG. 11

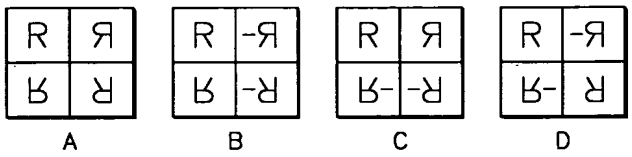


FIG. 12

DC	FIRST ROW						
FIRST COLUMN	D	C	D	C	D	C	D
	B	A	B	A	B	A	B
	D	C	D	C	D	C	D
	B	A	B	A	B	A	B
	D	C	D	C	D	C	D
	B	A	B	A	B	A	B
	D	C	D	C	D	C	D

FIG. 13

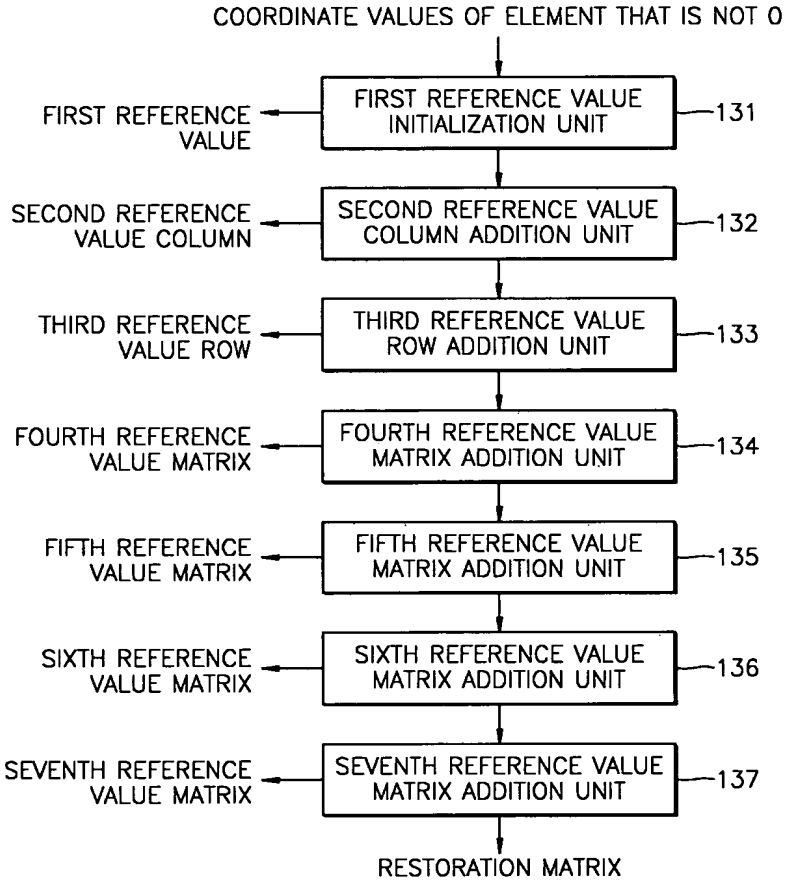

COORDINATE VALUES OF ELEMENT THAT IS NOT 0
FIRST REFERENCE VALUE
FIRST REFERENCE VALUE INITIALIZATION UNIT
131
SECOND REFERENCE VALUE COLUMN
SECOND REFERENCE VALUE COLUMN ADDITION UNIT
132
THIRD REFERENCE VALUE ROW
THIRD REFERENCE VALUE ROW ADDITION UNIT
133
FOURTH REFERENCE VALUE MATRIX
FOURTH REFERENCE VALUE MATRIX ADDITION UNIT
134
FIFTH REFERENCE VALUE MATRIX
FIFTH REFERENCE VALUE MATRIX ADDITION UNIT
135
SIXTH REFERENCE VALUE MATRIX
SIXTH REFERENCE VALUE MATRIX ADDITION UNIT
136
SEVENTH REFERENCE VALUE MATRIX
SEVENTH REFERENCE VALUE MATRIX ADDITION UNIT
137
RESTORATION MATRIX

FIG. 14

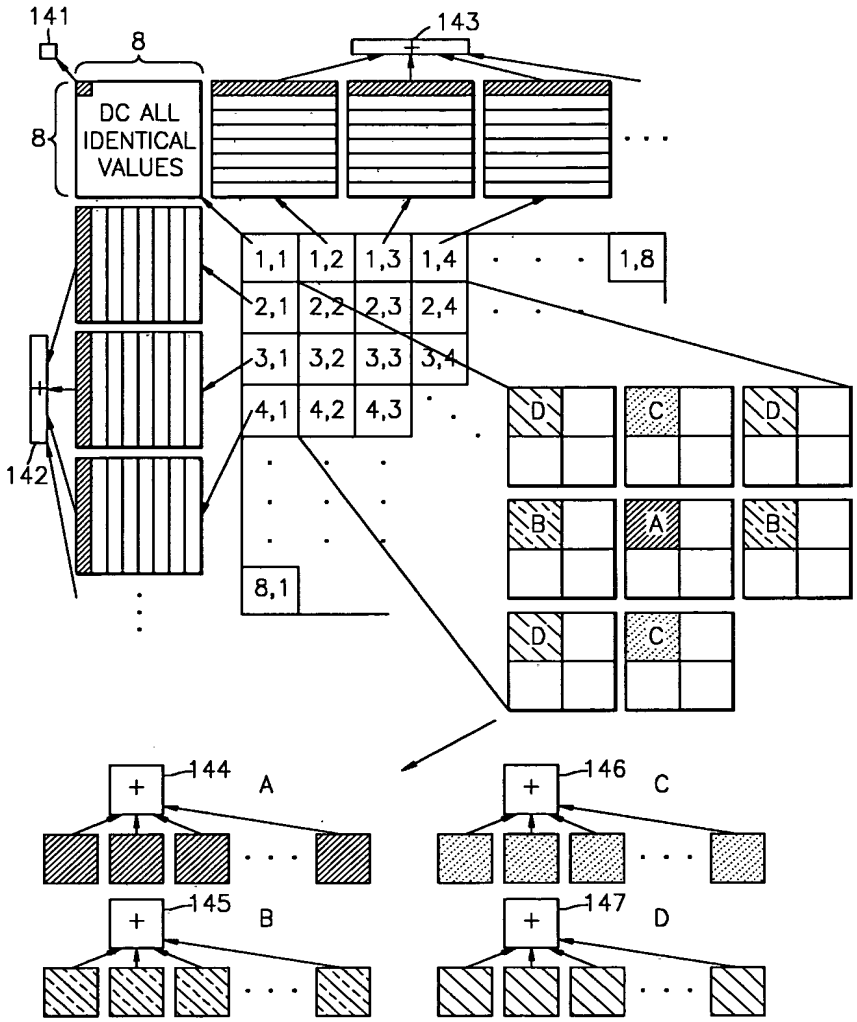

141
8
143
8
DC ALL IDENTICAL VALUES
1,1 1,2 1,3 1,4 1,8
2,1 2,2 2,3 2,4
3,1 3,2 3,3 3,4
4,1 4,2 4,3
8,1
142
D C D
B A B
D C
144 A
146 C
145 B
147 D

FIG. 15

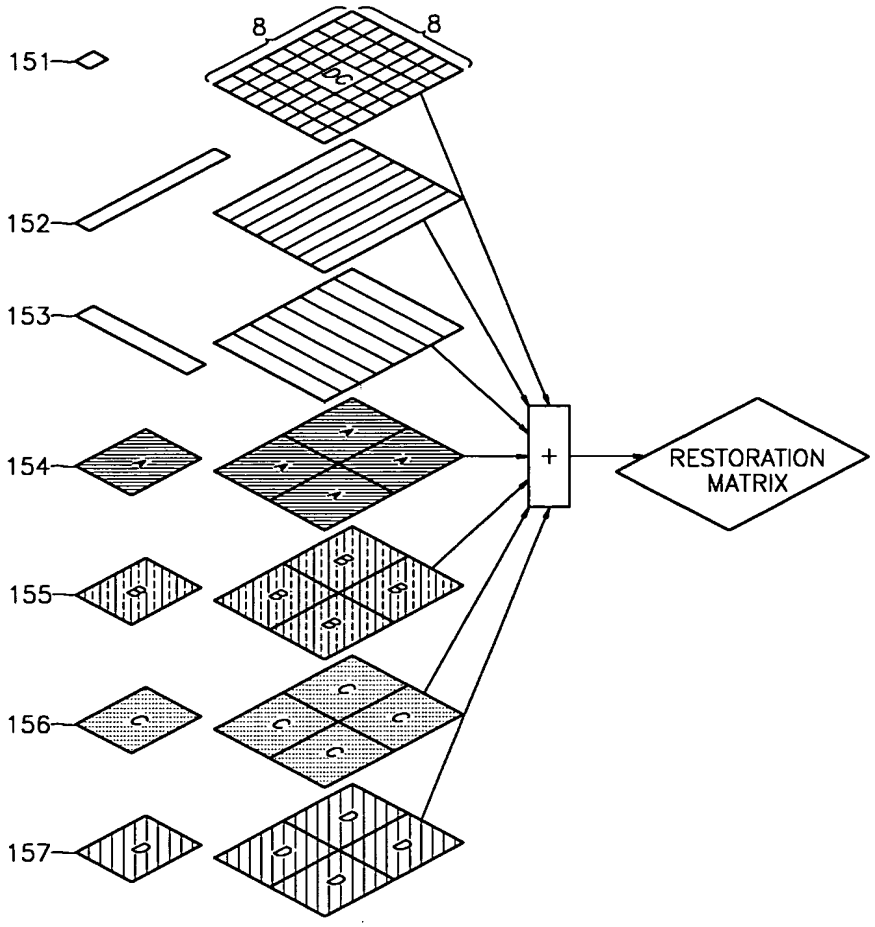


FIG. 16

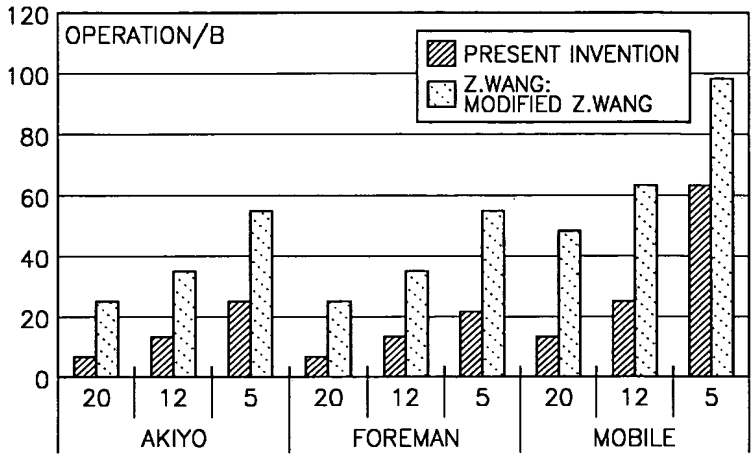

120
100
80
60
40
20
0
OPERATION/B
PRESENT INVENTION
Z.WANG:
MODIFIED Z.WANG
20
12
5
20
12
5
20
12
5
AKIYO
FOREMAN
MOBILE

FIG. 17

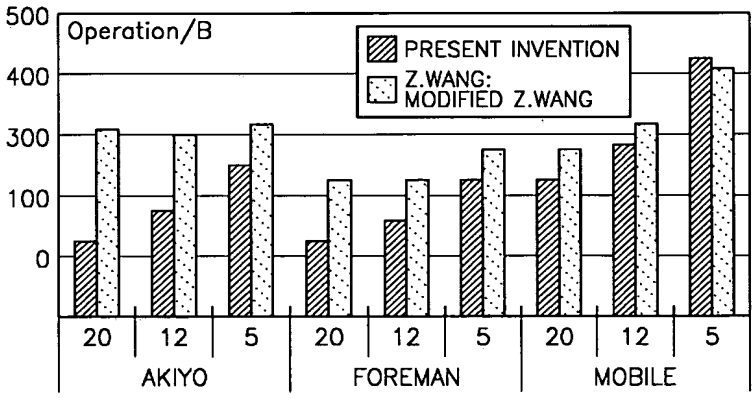

500
400
300
100
0
Operation/B
PRESENT INVENTION
Z.WANG:
MODIFIED Z.WANG
20
12
5
20
12
5
20
12
5
AKIYO
FOREMAN
MOBILE

FIG. 18

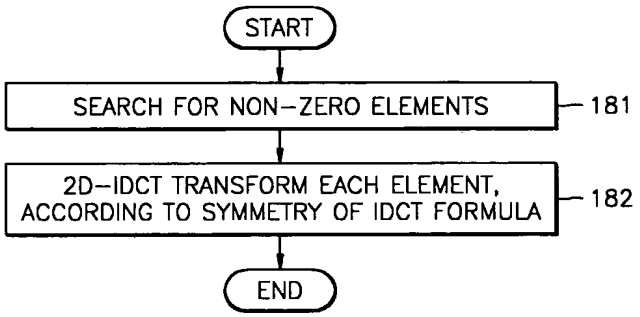

START
SEARCH FOR NON-ZERO ELEMENTS
181
2D-IDCT TRANSFORM EACH ELEMENT, ACCORDING TO SYMMETRY OF IDCT FORMULA
182
END

FIG. 19

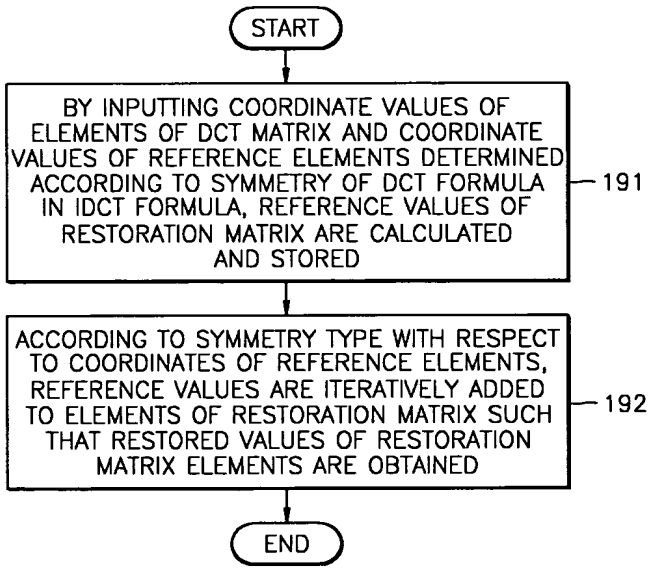

START
BY INPUTTING COORDINATE VALUES OF ELEMENTS OF DCT MATRIX AND COORDINATE VALUES OF REFERENCE ELEMENTS DETERMINED ACCORDING TO SYMMETRY OF DCT FORMULA IN IDCT FORMULA, REFERENCE VALUES OF RESTORATION MATRIX ARE CALCULATED AND STORED
191
ACCORDING TO SYMMETRY TYPE WITH RESPECT TO COORDINATES OF REFERENCE ELEMENTS, REFERENCE VALUES ARE ITERATIVELY ADDED TO ELEMENTS OF RESTORATION MATRIX SUCH THAT RESTORED VALUES OF RESTORATION MATRIX ELEMENTS ARE OBTAINED
192
END

FIG. 20

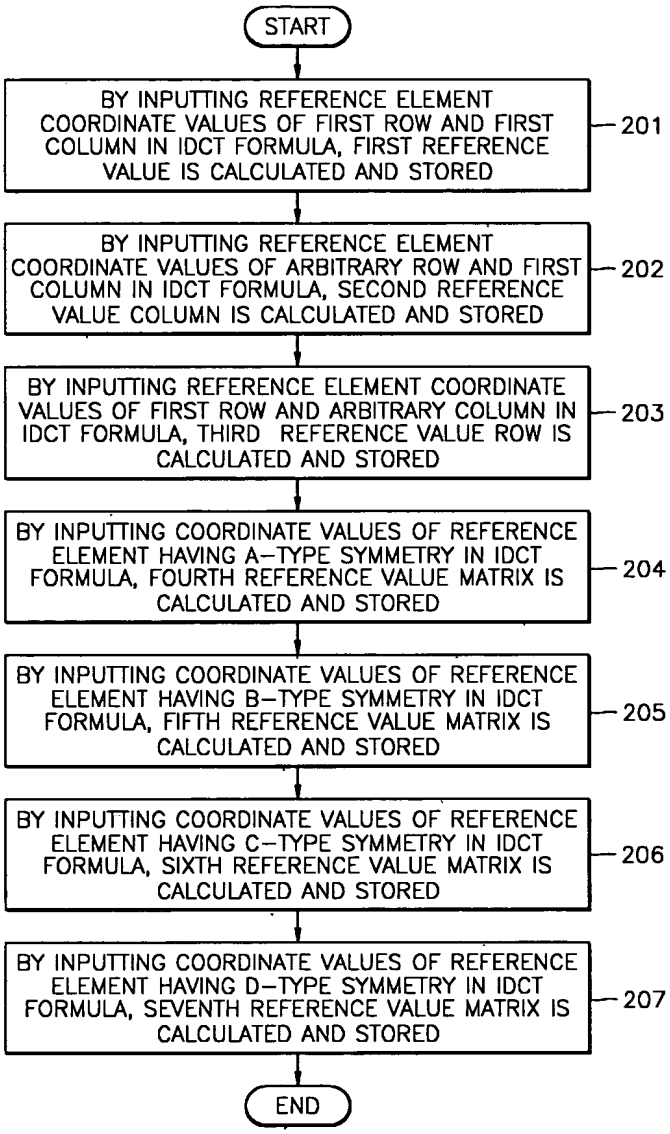
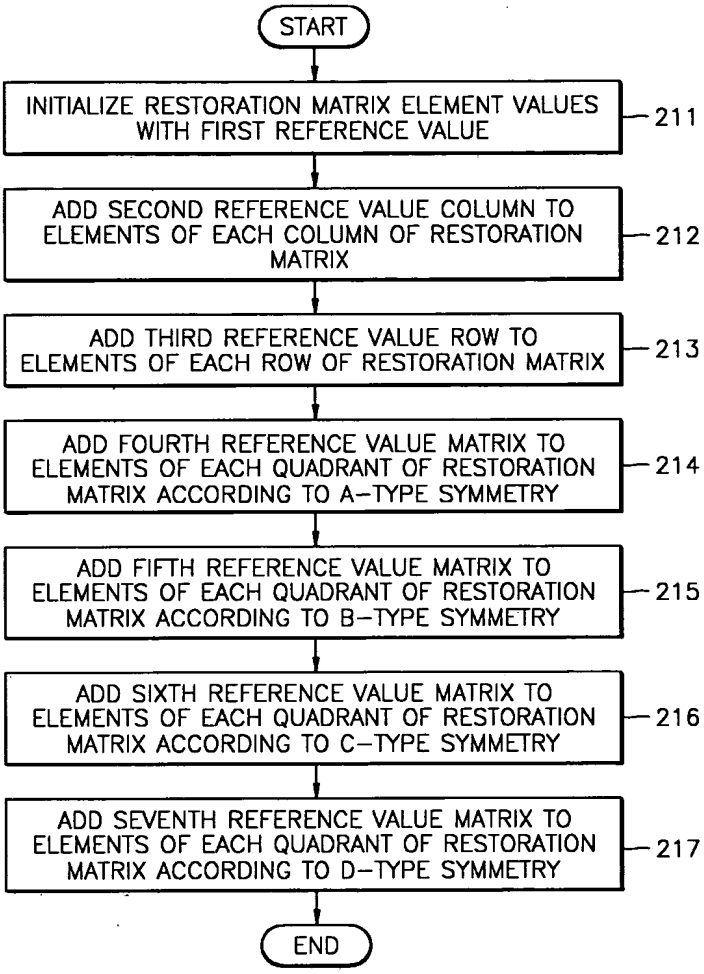

START
BY INPUTTING REFERENCE ELEMENT COORDINATE VALUES OF FIRST ROW AND FIRST COLUMN IN IDCT FORMULA, FIRST REFERENCE VALUE IS CALCULATED AND STORED
201
BY INPUTTING REFERENCE ELEMENT COORDINATE VALUES OF ARBITRARY ROW AND FIRST COLUMN IN IDCT FORMULA, SECOND REFERENCE VALUE COLUMN IS CALCULATED AND STORED
202
BY INPUTTING REFERENCE ELEMENT COORDINATE VALUES OF FIRST ROW AND ARBITRARY COLUMN IN IDCT FORMULA, THIRD REFERENCE VALUE ROW IS CALCULATED AND STORED
203
BY INPUTTING COORDINATE VALUES OF REFERENCE ELEMENT HAVING A-TYPE SYMMETRY IN IDCT FORMULA, FOURTH REFERENCE VALUE MATRIX IS CALCULATED AND STORED
204
BY INPUTTING COORDINATE VALUES OF REFERENCE ELEMENT HAVING B-TYPE SYMMETRY IN IDCT FORMULA, FIFTH REFERENCE VALUE MATRIX IS CALCULATED AND STORED
205
BY INPUTTING COORDINATE VALUES OF REFERENCE ELEMENT HAVING C-TYPE SYMMETRY IN IDCT FORMULA, SIXTH REFERENCE VALUE MATRIX IS CALCULATED AND STORED
206
BY INPUTTING COORDINATE VALUES OF REFERENCE ELEMENT HAVING D-TYPE SYMMETRY IN IDCT FORMULA, SEVENTH REFERENCE VALUE MATRIX IS CALCULATED AND STORED
207
END

FIG. 21


START
INITIALIZE RESTORATION MATRIX ELEMENT VALUES WITH FIRST REFERENCE VALUE
211
ADD SECOND REFERENCE VALUE COLUMN TO ELEMENTS OF EACH COLUMN OF RESTORATION MATRIX
212
ADD THIRD REFERENCE VALUE ROW TO ELEMENTS OF EACH ROW OF RESTORATION MATRIX
213
ADD FOURTH REFERENCE VALUE MATRIX TO ELEMENTS OF EACH QUADRANT OF RESTORATION MATRIX ACCORDING TO A-TYPE SYMMETRY
214
ADD FIFTH REFERENCE VALUE MATRIX TO ELEMENTS OF EACH QUADRANT OF RESTORATION MATRIX ACCORDING TO B-TYPE SYMMETRY
215
ADD SIXTH REFERENCE VALUE MATRIX TO ELEMENTS OF EACH QUADRANT OF RESTORATION MATRIX ACCORDING TO C-TYPE SYMMETRY
216
ADD SEVENTH REFERENCE VALUE MATRIX TO ELEMENTS OF EACH QUADRANT OF RESTORATION MATRIX ACCORDING TO D-TYPE SYMMETRY
217
END